in Cygnus A is a consistent one. For a normal gas-to-dust ratio, the proposed continuum extinction is roughly consistent with the observed absorbing column density along the line of sight to the X-ray source[2] (8×10^{22} cm^{-2}). Furthermore, there is an excess of far-infrared luminosity that is comparable to the amount of shorter-wave radiation that must be absorbed, as would be expected if it were re-radiated by dust[5]. (Interestingly, the far-infrared peak is relatively narrow, indicating that the dust has a well-defined temperature, of about 75 K, so that its spatial distribution is probably narrow, like a torus, rather than extended, as a warped disk would be.)

Although these observations offer a tantalizing glimpse into the possibilities of verifying unified schemes for active galactic nuclei, additional questions remain. Foremost, can the broad-line region that is characteristic of all quasars be detected directly in Cygnus A? Transmitted Paschen lines might be seen or the spectrum of scattered, polarized light could be searched for broad lines. If unification survives that test, the relation of Cygnus A to the much more numerous high-redshift radio galaxies (and hence high-redshift quasars) is still not understood. And even if the global unified scheme for radio-galaxies and quasar proves true, a detailed understanding of the structure of radio galaxies remains an important goal. Why are many intrinsically asymmetric? What is the geometry of the obscuring material and nuclear continuum source? And is the continuum source itself intrinsically anisotropic? How do radio galaxies form and evolve? None of these questions will be easy to answer, but to start by demonstrating the unification between radio galaxies and quasars in the case of Cygnus A would be an enormous step forward. □

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OBITUARY

Allan Charles Wilson (1934–1991)

ALLAN Wilson, the most influential figure in the empirical study of molecular evolution, died on 21 July from complications resulting from bone-marrow transplantation for treatment of leukaemia. He was at the height of his productivity.

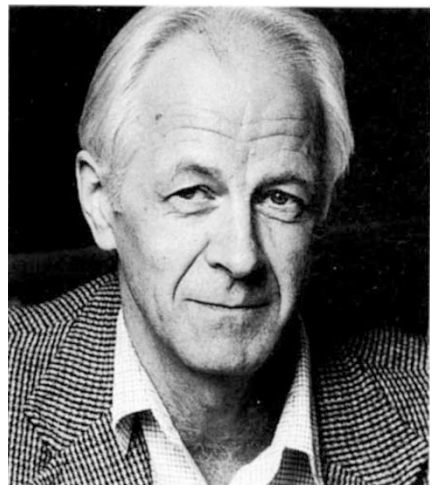
Born in Ngaruawahia, New Zealand, he remained a New Zealand citizen. He received his PhD in 1961 from the University of California at Berkeley, under Arthur Pardee. After postdoctoral study with Nathan Kaplan at Brandeis University, he joined his old department at Berkeley, where he remained, building up the most prominent of the groups working on molecular evolution.

Systematists, microbiologists and biochemists came to Berkeley to learn the techniques involved. But Wilson's influence went beyond this. While others concentrated on what evolution could tell them about molecules, Allan always looked for ways that molecules could say something about evolution.

His greatest effect was on the study of human evolution. In early work with Vincent Sarich, he used immunological methods to study hominid proteins and come to the conclusion that humans and African apes shared a common ancestor only five million years ago. To physical anthropologists this date was far too recent; it has gained increasing acceptance. With Mary-Claire King he used electrophoresis to estimate that human and chimpanzee proteins differ by only 1 per cent, a remarkably small figure. And with Wes Brown and Stephen Ferris, he made a restriction sites phylogeny that grouped humans with the African apes.

The disputes over these results paled in comparison with the uproar that attended appearance of the paper by Cann, Stoneking and Wilson (*Nature* 325, 31–36; 1987), in which restriction-site variation in human mitochondrial lineages was employed to place the common mitochondrial ancestor in Africa 200,000 years ago. Much of the publicity was based on the mistaken belief that this mitochondrial 'Eve' was the only female of that generation who had modern descendants, thereby resonating with popular notions of Earth-mother goddesses and creationism. The work actually implied that population sizes were in the low thousands at that time. A more controversial implication is that *Homo erectus* and Neanderthals in places other than Africa contributed few or no mitochondria to present-day humans. There is no standard error on the dates, so that we do not yet know how strong this conclusion is.

Wilson's research, much of it carried out in collaboration with his associate Ellen Prager, proceeded from immunological methods to restriction sites to DNA sequencing. His laboratory was one of the first to use the polymerase chain reaction, and had a close involvement in simplifying mathematical methods for analysing data. The laboratory was a leader in sequencing 'fossil DNA', with studies on the extinct quagga by Russell Higuchi and human mummies by Svante Pääbo that both made news and broke new ground scientifically.



Allan Wilson — 'father' of 'Eve'.

Much of the work depended on the 'molecular clock', for which Wilson was one of the principal advocates. It is clear that this 'clock' runs at different rates in different groups; it is not universal. Morphologists tend to dismiss it as simply wrong, but for related species it is a useful and fruitful approximation. Wilson spent considerable effort in trying to quantify morphological evolution. He argued, for example, that frogs had diversified less than mammals in the same time, and speculated that this was because morphology interacted with mammalian social behaviour. He also argued that morphological change is a consequence of a specialized class of regulatory mutations.

Allan Wilson was a retiring man who yet managed to publicize his work to great effect; he was simultaneously daring in his hypotheses and sensitive to criticism. He and his wife of 31 years, Leona, faced his final struggle together with great courage. As he prepared to undergo transplantion, he became interested in HLA and expressed the view that African mitochondrial diversity implies that there should be many more HLA alleles waiting to be discovered there. It is typical of Allan that he leaves a legacy of challenging hypotheses that encourage us to collect more and better data. Joseph Felsenstein

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